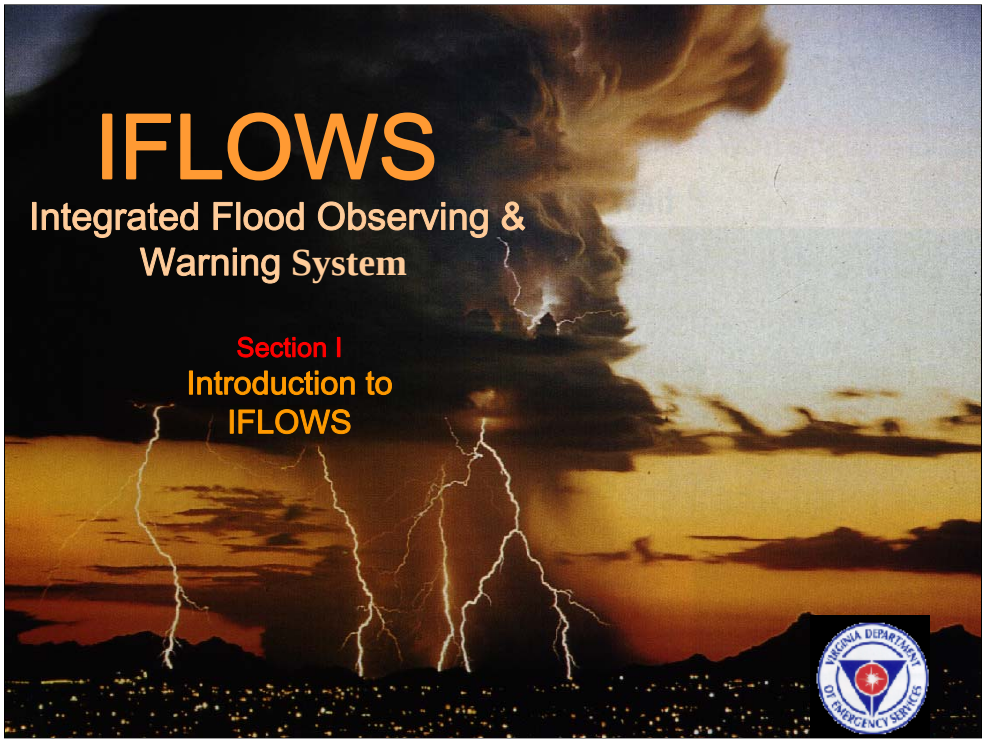
Introduction To IFLOWS



Course GOAL:

1. Give instruction on how to use the IFLOWS program modules so personnel will be able to update the Flash Flood Guidance.

2.Interpret IFLOWS data.

3. Read IFLOWS text messages.

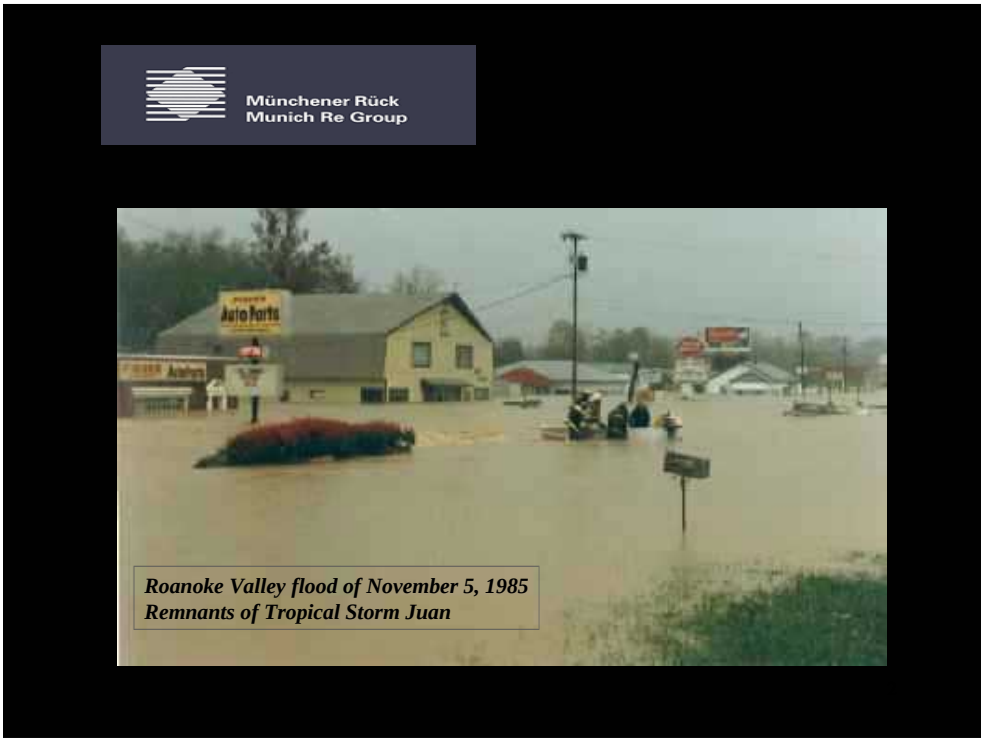
Enabling OBJECTIVES:

1.The student will retrieve the NWS Flash Flood Guidance and calibrate IFLOWS using the new Flash Flood Guidance.

2.The student will use the MONITOR program to view and interpret *REAL TIME* data.

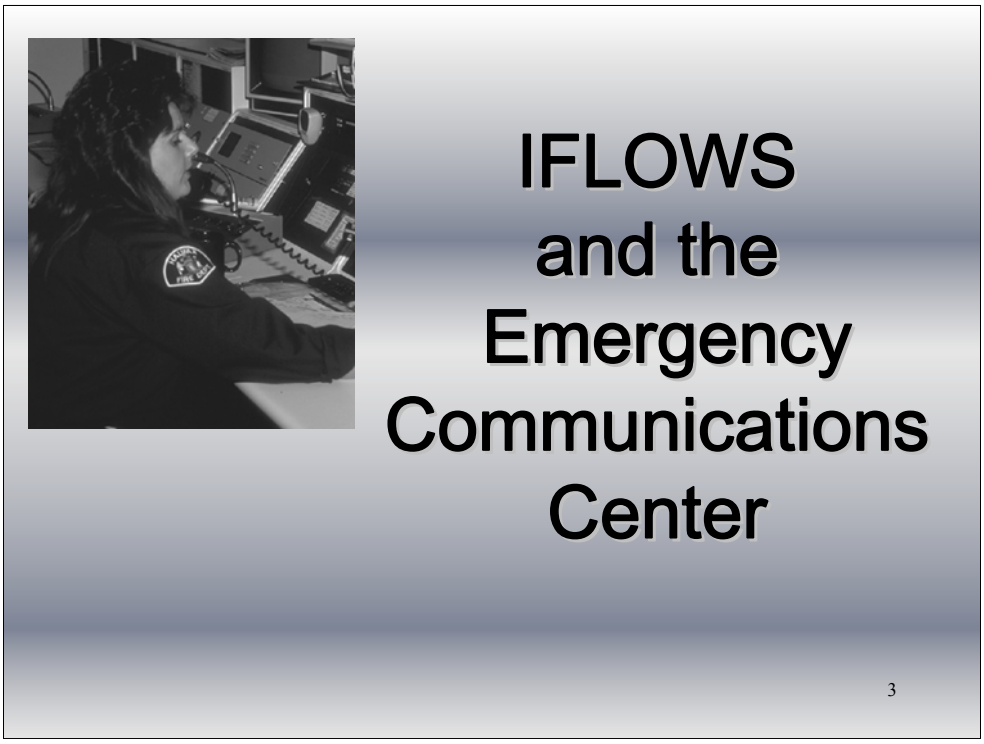
3. Use the OBSERVATION program to view Stream & Rain Gauge data - *REAL TIME & HISTORY*.

Climate Change - More Floods?



Munich Re Group is an insurance underwriters group based in Germany. They have a dedicated staff of climatologist that study climate change. Fifteen years ago these scientists predicted a significant increase in extreme weather events around the world due to the rapid warming of the earths atmosphere.

Does this mean we are at risk of bigger floods?



The communications center is manned 24 hours a day and is the Emergency Manager's first line of defense against the loss of life and property damage due to flooding. The local Emergency Manager and the Emergency Communications Center supervisor need to develop Standard Operating Guidelines indicating what actions must be taken by the Emergency Communication Center personnel when IFLOWS alerts are received. Some of the duties that should be addressed in the guidelines include:

1) Who is responsible for updating the flashflood guidance.

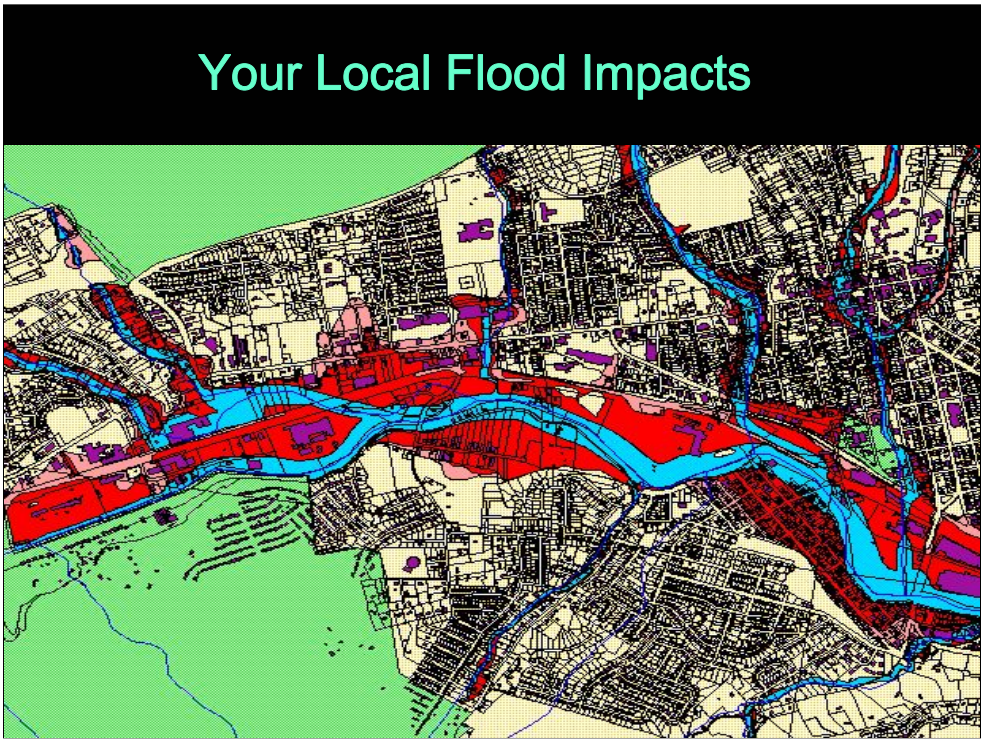
2) What notifications need to be made when rain and stream gauge alarms are received.

3) When does the responsibility of monitoring IFLOWS shift from the Emergency Communication Center personnel to Emergency Management.

4) Who is notified concerning IFLOWS equipment malfunction.

Timely IFLOWS alarm messages relayed to the local Emergency Manager will in most cases provide lead time allowing time to activate the EOC, mobilize resources and make appropriate notifications.

Know Your Flood Impacts

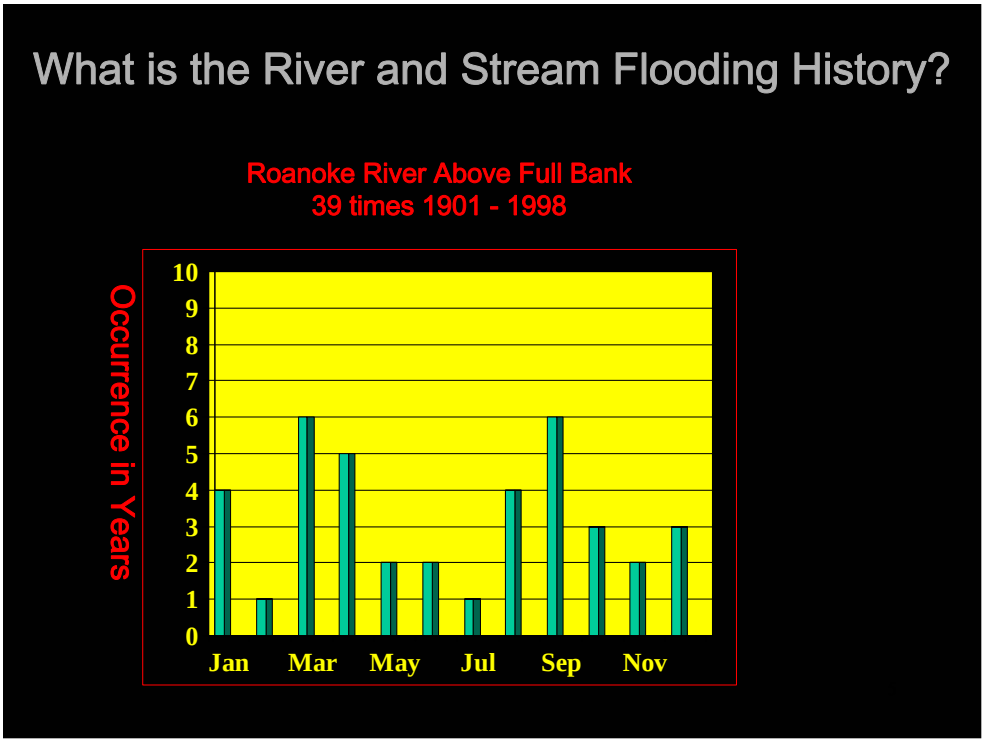


Knowing where your flood impacts are and the stream levels that cause these impacts will aid the local Emergency Management Coordinator in customizing IFLOWS. This customization should be administrated by one person.

Usually this is the local Emergency Management Coordinator.

Motor boats such as this one rescued hundreds of residents in the Roanoke Valley who were trapped by the sudden deluge of water. Photo, Roanoke Times.

Know Your Flood History

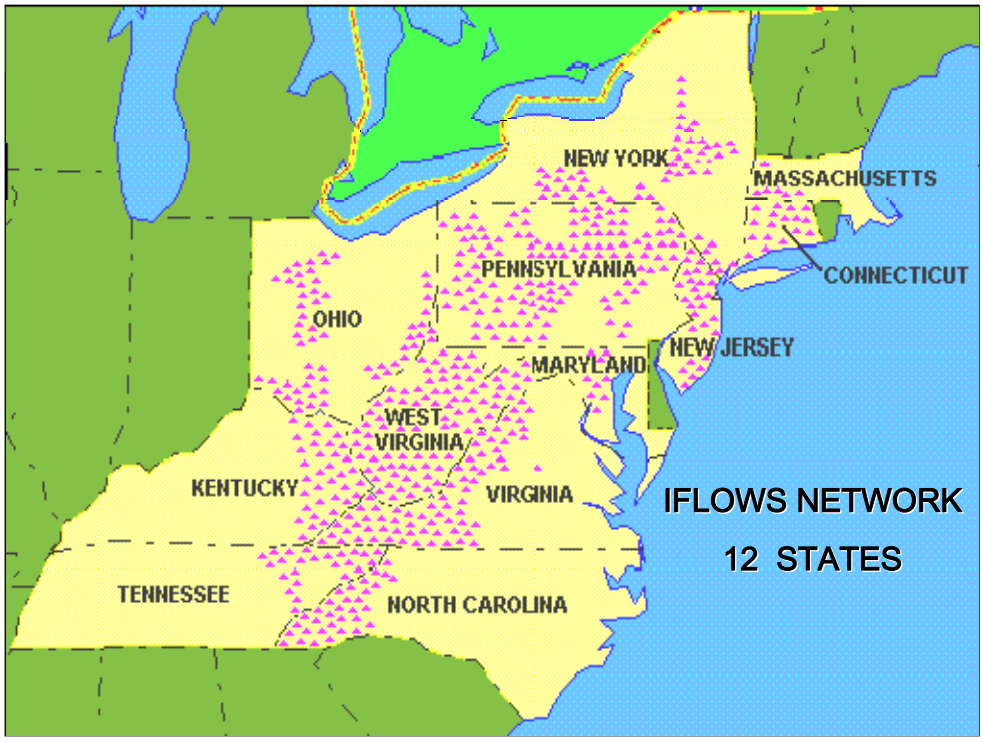


The National Weather Service will be able to provide the local Emergency Manager with a lot of data relating to the rivers and streams of concern. Researching area news papers and requesting past flood data from the local engineering department will also provide additional information on past flood events.

Flood History Sources

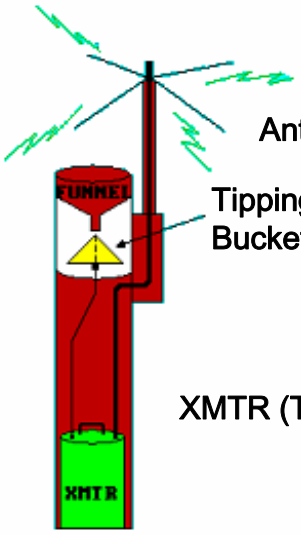
- National Weather Service
- Local News Paper
- Engineering Department

The IFLOWS Network



This Automated Flood Warning Systems network connects numerous local flood warning systems, and integrates and shares information from computers and rain and stream sensors. In Virginia it is possible for an IFLOWS computer in the far southwest part of the state to view gauge data from other distant areas of the state.

The Rain Gauge



Antenna – Omnidirectional

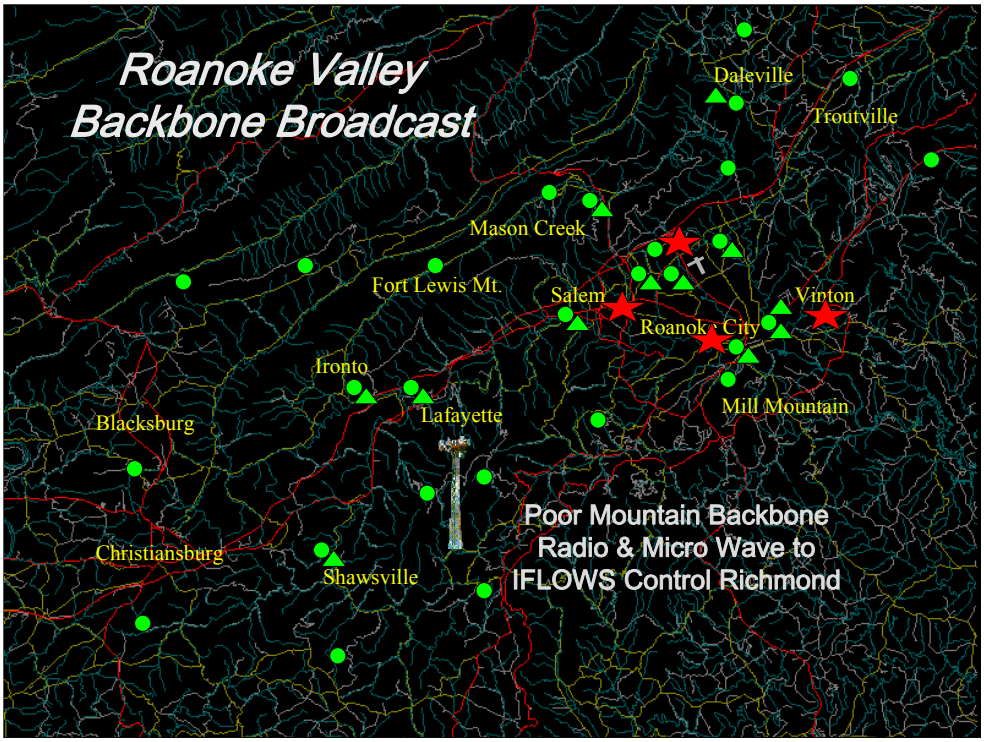
Tipping Bucket

Works like a seesaw. Tips when .04 inches of rain accumulates.

XMTR (Transmitter)

The transmitter sends out a signal with every tip. The signal consists of the Gauge ID (GID) & the accumulated amounts of tips.

IFLOWS Data Received 2 Ways



The Emergency Communications Center (911 Center) receives IFLOWS gauge data 2 ways:

1) Direct from the gauge to the 911 center IFLOWS computer
2) Indirect from the backbone (the IFLOWS/Microwave radio net).

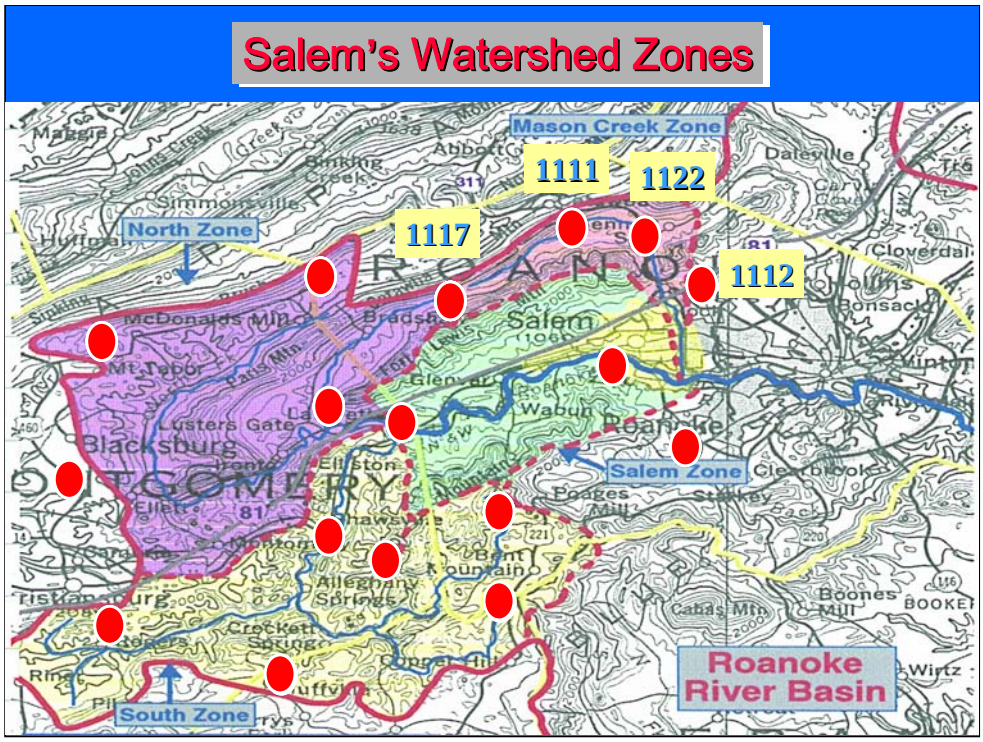
Gauge data enters the backbone (IFLOWS/Microwave radio net) by the data first being received locally by an IFLOWS computer. The local IFLOWS computer processes, displays and saves the gauge data. The IFLOWS computer in Richmond (IFLOWS Control) using the backbone (IFLOWS radio/Microwave net) sends out a radio poll (a request for gauge data) to all of the local IFLOWS computers in Virginia. IFLOWS Control requests that the local IFLOWS computers share all of the collected gauge data with Richmond. Once IFLOWS Control has the gauge data from the local computers IFLOWS Control transmits that collected gauge data to all of the local IFLOWS sites. This makes it possible for a local computer to see rain and stream gauge data from any of the Virginia gauges that are out of radio range of the local IFLOWS computer.

IFLOWS data is received two ways :

1) Local Gauge transmissions Updated in *Real Time* directly from the gauge.

2) Network Gauge transmissions Updated every 15 minutes as network traffic allows. This gauge data comes indirectly from the gauge routing from the gauge, then to IFLOWS Control in Richmond then out to all of the IFLOWS computers in the field.

Identify Your Watersheds



Identify the watersheds that affects your locality. Next plot the locations of the rain and steam gauges that affect your watersheds.

Rain Gauges - Salem Watershed Zones

Mason Creek Zone 4 gauges

Fort Lewis Mt, Mason Cove, Mason Creek, Peter's Creek

North Roanoke River Zone 5 gauges

Fort Lewis, Crawfords Ridge, Bush Mt, Blacksburg, Ironto

South Roanoke River Zone 6 gauges

Witt's Orchard, Copper Hill, Mt View Church, Rose Hill, Poor Mt, Shawsville

Salem Zone 5 gauges

Lafayette, Fort Lewis Mt, Salem Pump Station, Witts Orchard, Sugarloaf Mt.

Is your gauge data received directly from the gauge or does it come from IFLOWS Control in Richmond?

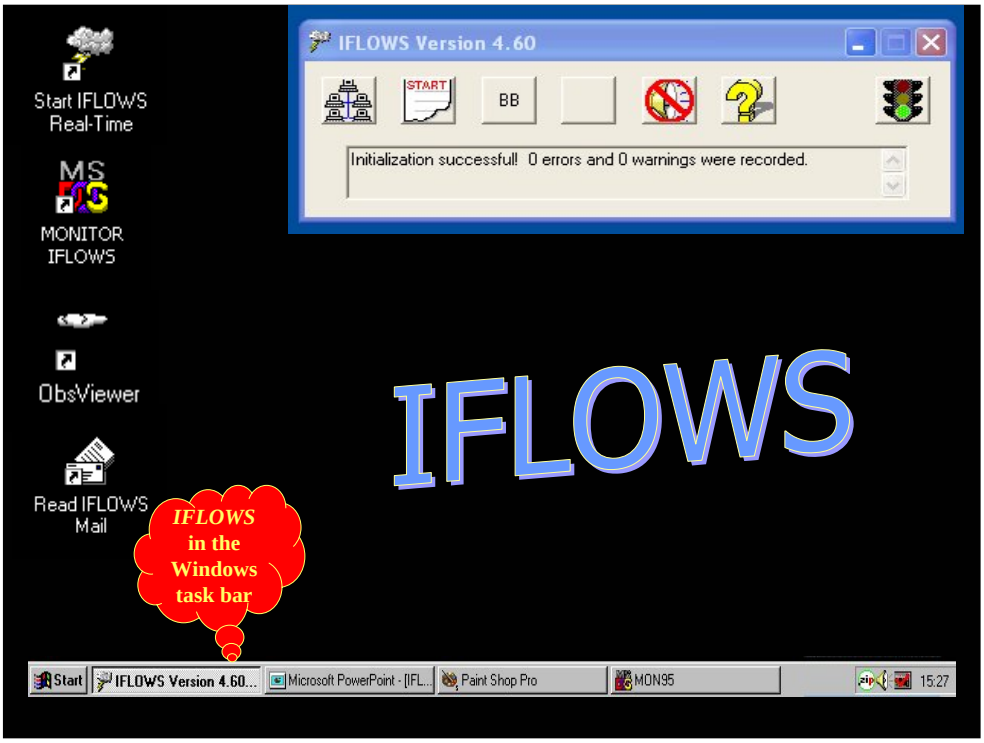
Flood Facts

DID YOU KNOW...

- Individuals and business owners can protect themselves from flood losses by purchasing flood insurance through National Flood Insurance Program. Homeowner's policies do not cover flood damage. Information is available through local insurance agents and emergency management offices.
- Flooding has caused the deaths of more than 10,000 people since 1900. Property damage from flooding now totals over $1 billion each year in the United States.
- If your home is within a mapped special flood hazard area you have a 26% chance of being flooded during a 30-year period (typical mortgage period).
- More than 2,200 lives were lost as a result of the Johnstown, Pennsylvania flood of 1889. This flood was caused by an upstream dam failure.
- Nearly 9 of every 10 presidential disaster declarations result from natural phenomena in which flooding was a major component.

On July 31, 1976, the Big Thompson River near Denver overflowed after an extremely heavy storm. A wall of water 19 feet high roared down the Big Thompson Canyon where many people were camping. 140 people perished and millions of dollars of property were lost.

IFLOWS The Program



When IFLOWS Real-Time is launched the Windows task bar will display a program icon. It needs to be noted the software can be stopped and the program icon can still visible in the task bar. It is recommended that the IFLOWS program window not be minimized so there is no question if the IFLOWS program is running. The green traffic light signal in the program window indicates that the IFLOWS is running and the software is functioning properly.

Starts the IFLOWS program.

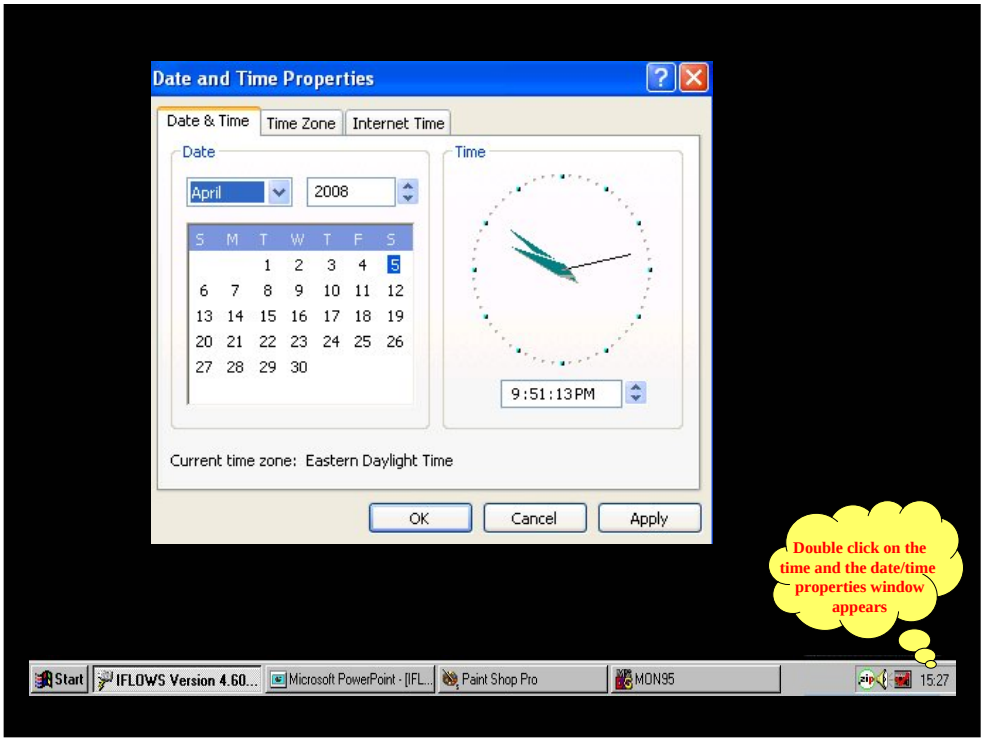
Starts the MONITOR program - View rain gauges in gauge groups; view stream gauges; update guidance

View rain and stream gauges in real-time and gauge history.

Read IFLOWS messages - IFLOWS email.

- **IFLOWS must be visible in the Windows task bar. If it is not then IFLOWS is not running.**
- **Modules can be started when IFLOWS is not running with *no warnings* indicating IFLOWS is not online.**

Date and Time Issues

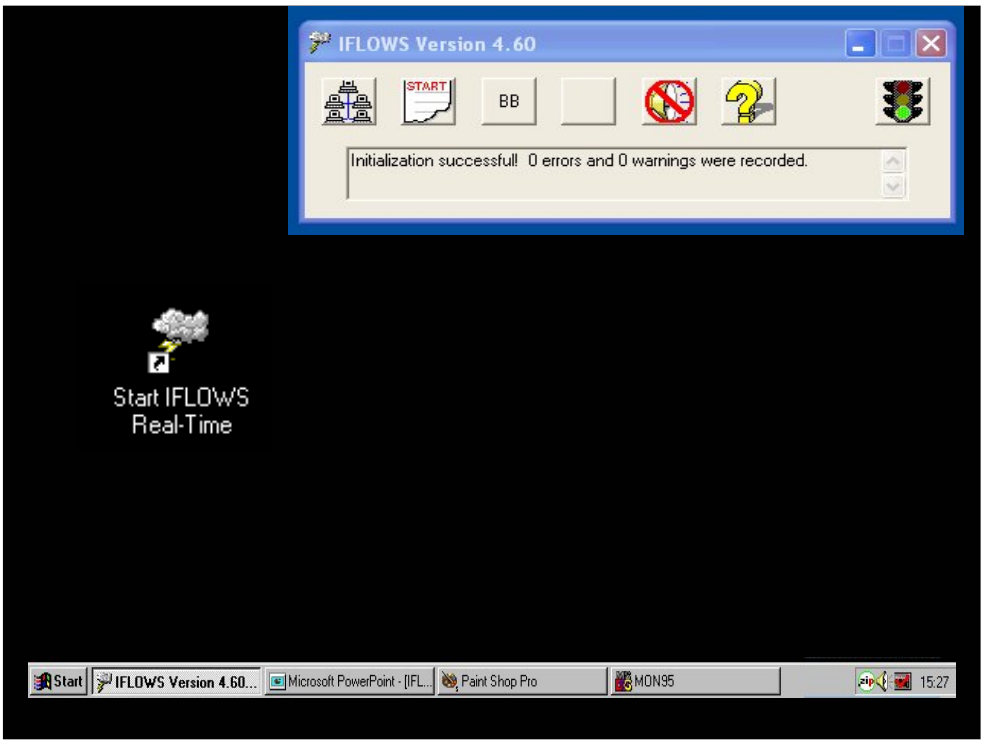


Having the correct date and time on the IFLOWS computer is necessary for the program to function properly. An incorrect date or time may prevent real-time data from being displayed on the IFLOWS computer. An incorrect time may cause IFLOWS rain and stream gauge data values to be compounded causing a single value to be doubled. This could falsify rainfall amounts causing the National Weather Service to issue a flood warning erroneously. IFLOWS Control now manages the local IFLOWS computer time and date which makes the time and date issue less of a problem. However, during the routine IFLOWS communication check date and time should be verified.

- IFLOWS date and time are controlled by Windows.
- Day light savings time is automatically handled by Windows
- ***IFLOWS will keep your Windows clock current and no intervention on your part should be required.***
- If you must change your computer date or time, *IFLOWS must be stopped and started* for the change to be accepted by IFLOWS.

IFLOWS date and time must be correct or the program *will not* process data properly.

Starting IFLOWS



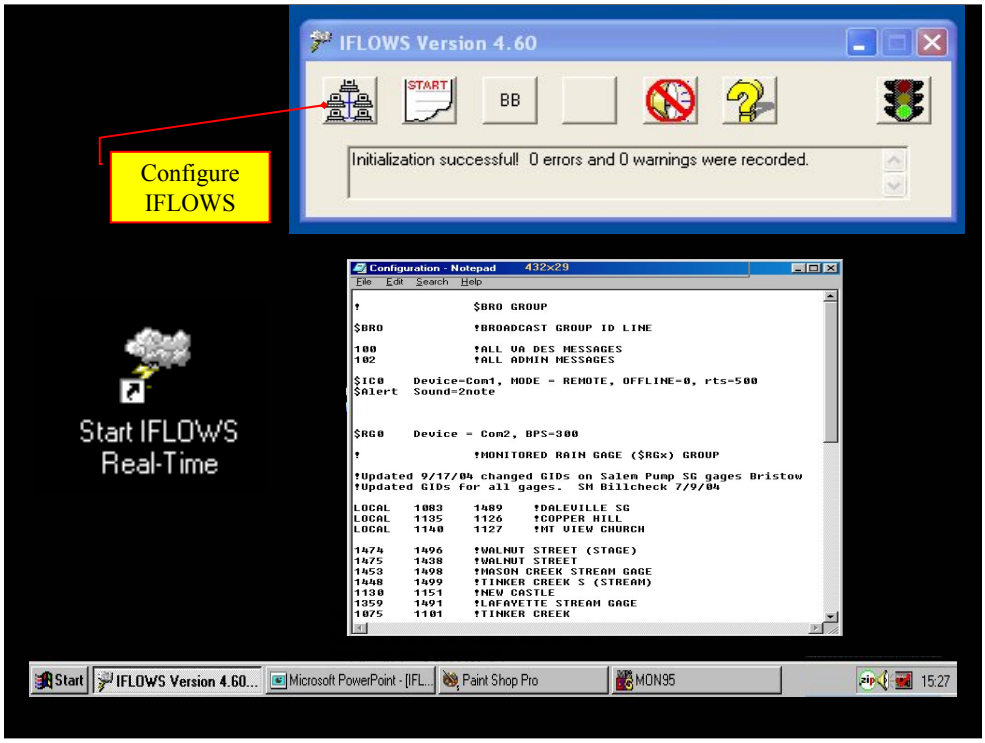
Click on the IFLOWS Real-Time icon to start IFLOWS. Notice the IFLOWS Real-Time icon in the task bar. This will always be present when IFLOWS software is running.

When IFLOWS starts look for the green traffic light signal and the message stating that the initialization is successful.

Common Operator Error

When the IFLOWS icon is clicked on after IFLOWS has started IFLOWS will try to start a second time. This causes a database error. Only one instance of IFLOWS software can run on the same computer.

IFLOWS Configuration



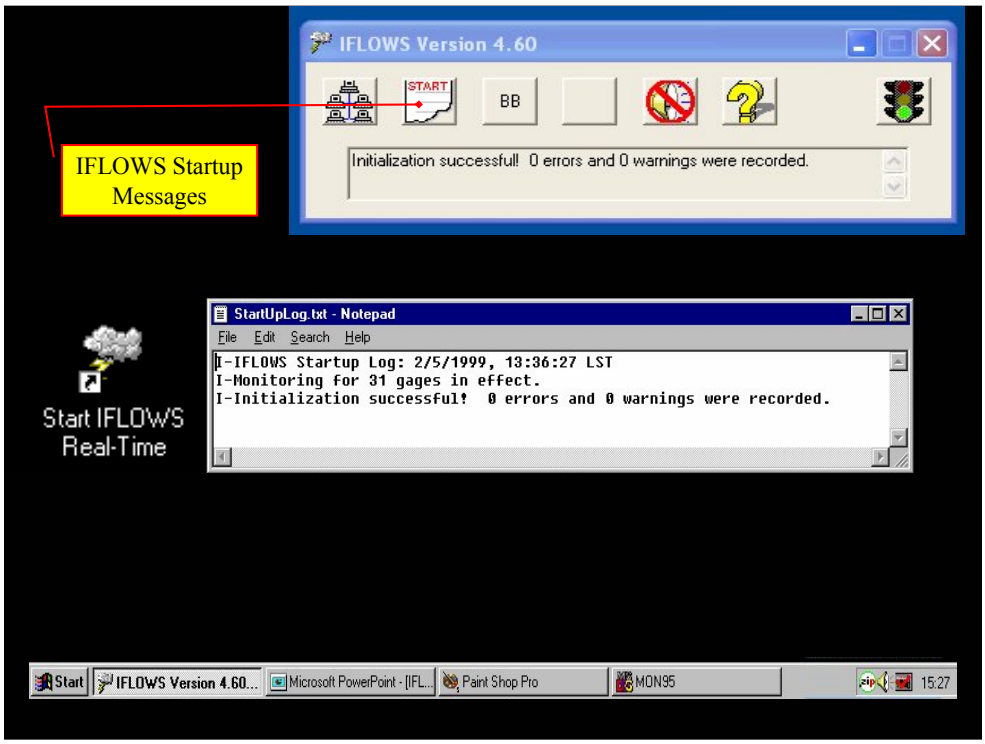
IFLOWS configuration screen:

The information in this file instructs IFLOWS how to function. If you accidentally open this file close it. ***DO NOT*** save changes when prompted.

Do Not change anything on this screen!

Do Not save changes to this file!

Startup Log



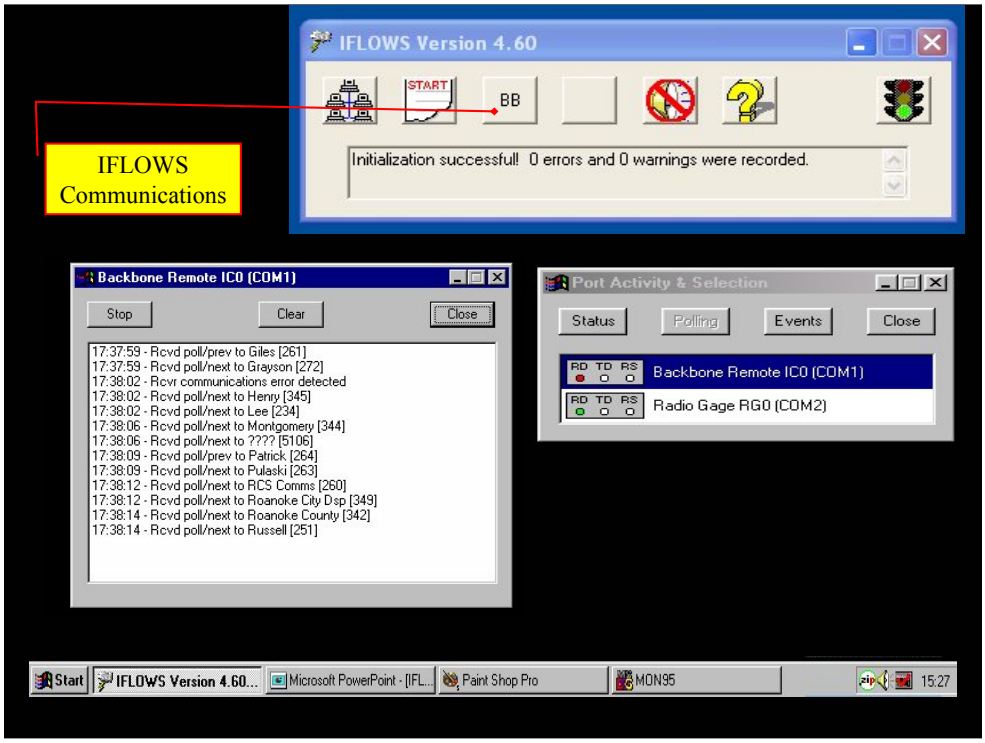
If the IFLOWS program fails to load this is the first place to look for clues as to why the failure. Information found on this screen when relayed to the IFLOWS technician will help solve the IFLOWS load failure.

For IFLOWS Technical Support Call:

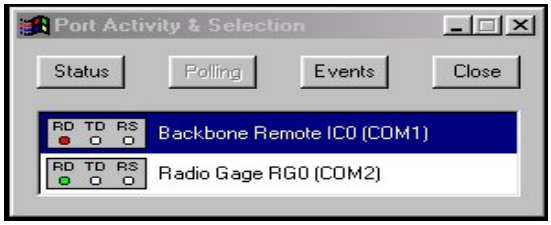
Mark Slauter 1-804-674-2405

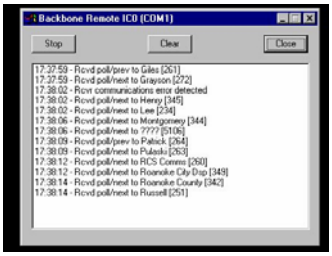
Jim Meece 1-423-323-1921

Port Activity & Selection

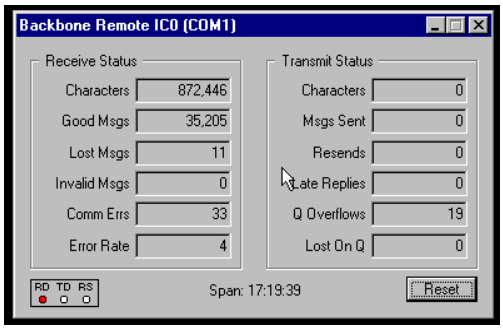


Click on to view communication port activity.



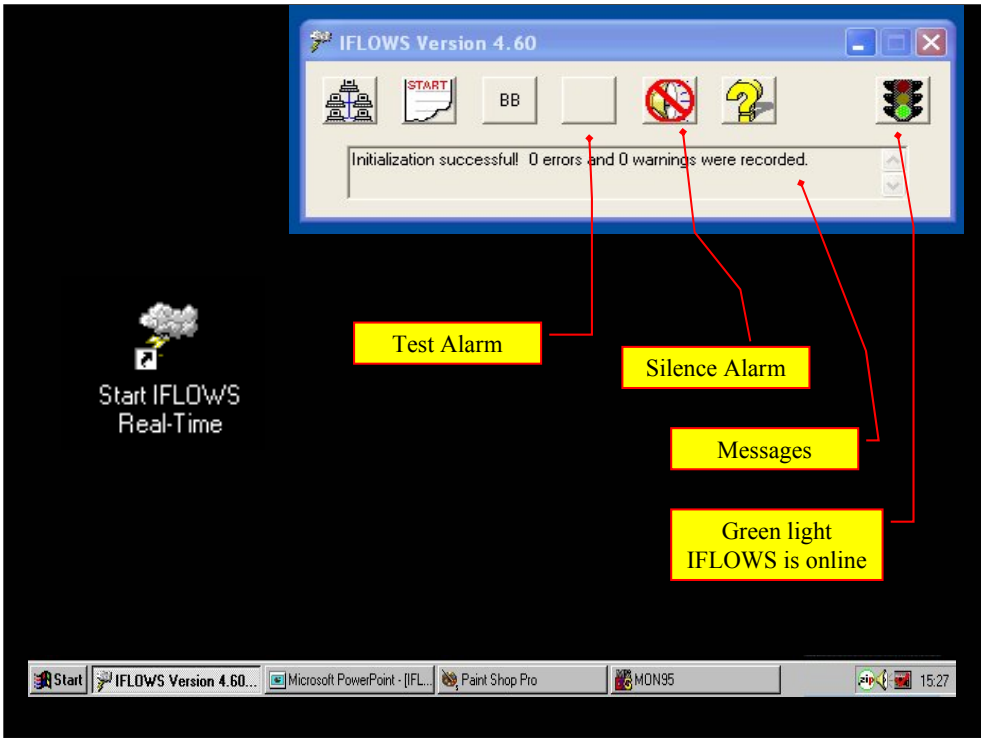


EVENTS Button - User can quickly determine if the computer is polling the IFLOWS network (backbone) and receiving data. If no data is scrolling across the screen then communications with the backbone does not exist.



Status Button - User can quickly determine if the IFLOWS program is receiving good data. The IFLOWS technician may ask you for information from this screen in an effort to trouble shoot a problem over the telephone.

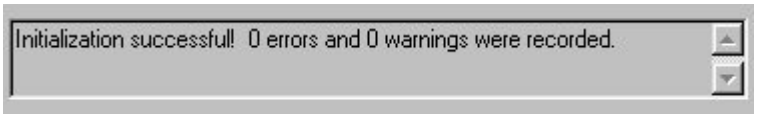
Test Alarm, Silence Alarm, Traffic Light, Message Window



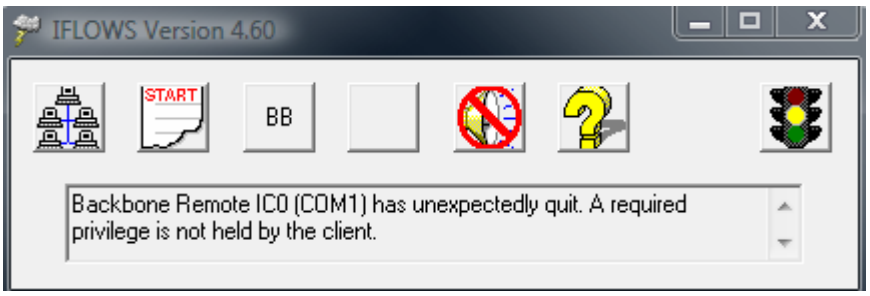
Click on this button to sound the IFLOWS alarm. The message below the button displays the message "*This is a test alert message*.".

Click on the button to silence the IFLOWS alarm.

When IFLOWS starts successfully the traffic light goes from red to green. A yellow light indicates a problem with computer hardware.



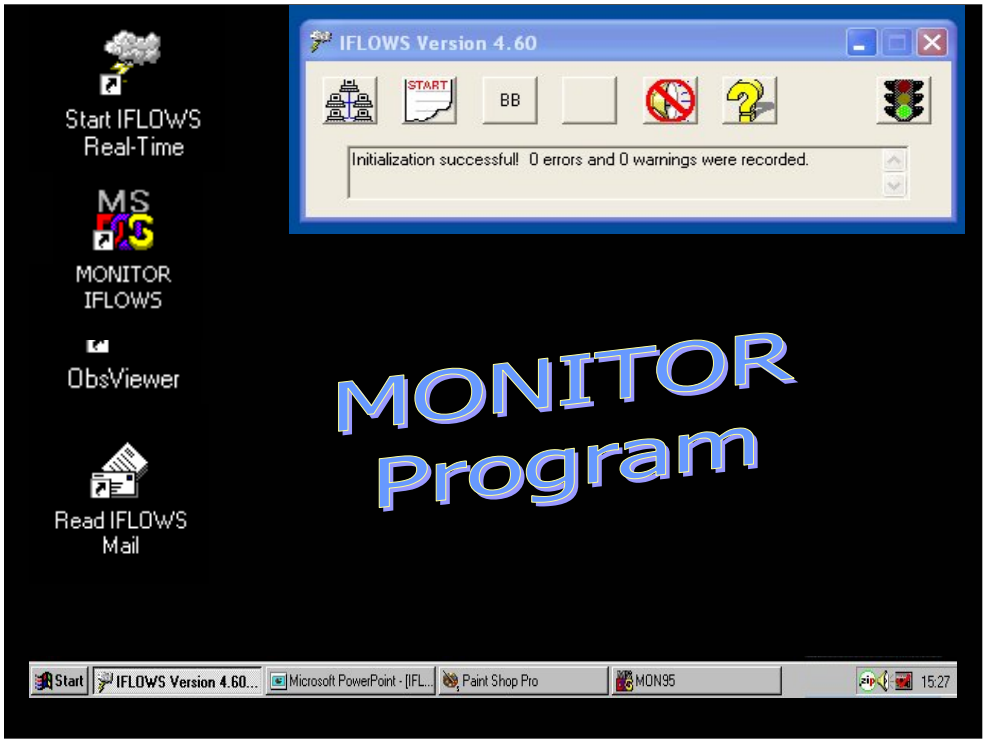
Message Window



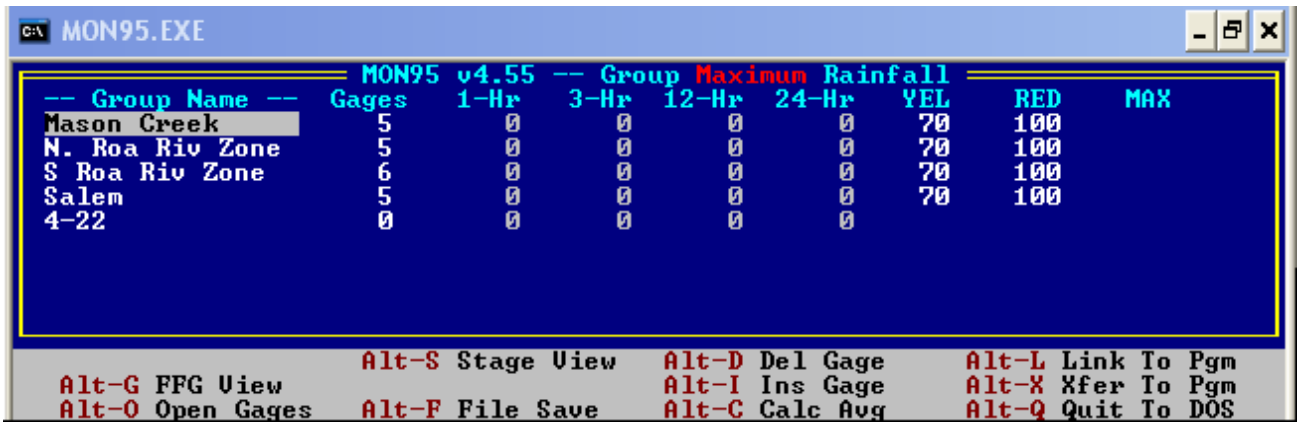
Note the yellow light indicating a communication problem with the com port. Report this problem to tech support listed on page 14.

IFLOWS generated messages are posted here as well as administrative messages (i.e. Flash Flood Guidance, hardware failure alerts, general text communications between IFLOWS sites and rain and stream gauge alarms. Messages can also be viewed and printed by clicking on the IFLOWS Read Mail Icon.

Starting Monitor

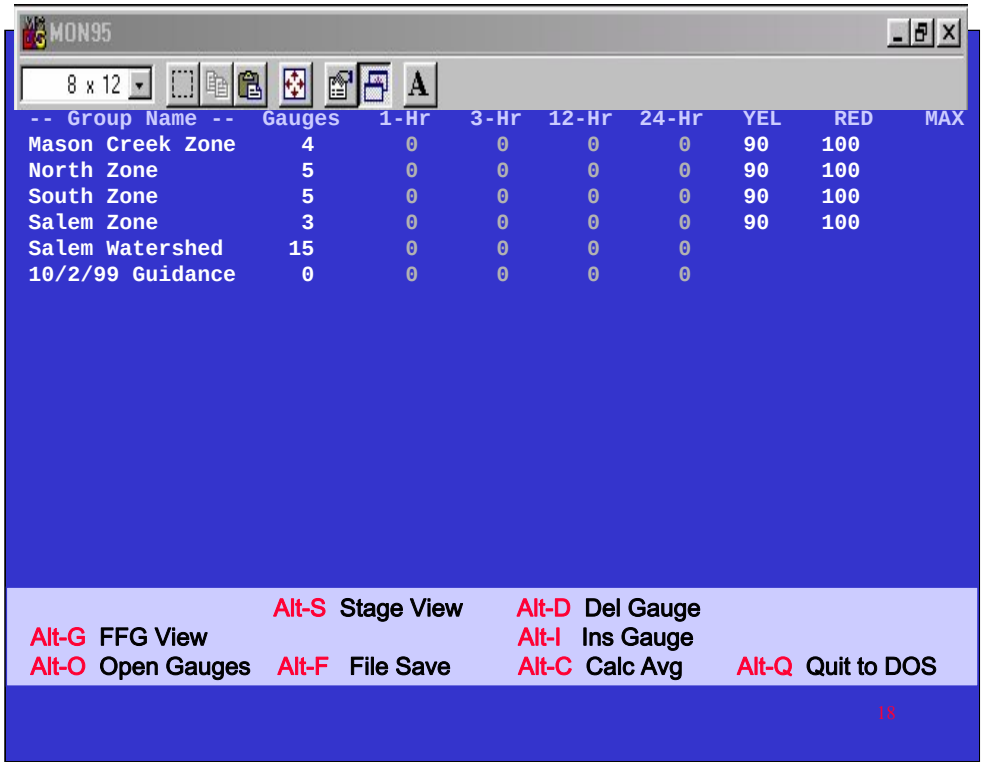


Click on the MONITOR icon to open the MONITOR program. The program opens in Group Maximum Rainfall view. The displayed gauge groups may contain one or more rain gauges. The gauge that displays rain amounts in this window is the gauge that has received the most rain. To view all of the gauges in the gauge group you must press the ALT-O keys, Open Gauges. This displays all of the gauges in the rain gauge group. To return to the rain gauge group page press ALT-R. Pressing the ESC key returns you to the previous window. The menu at the bottom of the window will aid in your navigation between the windows.



No Mouse Control in the MONITOR program!
You must use your TAB keys or ARROW keys to move your cursor.

Monitor Program Features



MONITOR Program

Displays rain and stream values, allows user to customize alarm thresholds, sounds alarm when thresholds are exceeded.

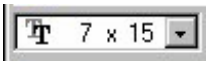
Communications Center personnel will need to be familiar with the following functions and interpret the displayed IFLOWS data.

MONITOR allows the user to:

- View Latest Alarm Values
- Upgrade Flash Flood Guidance
- View Rain Gauge data - 1 hour / 3 hour / 12 hour / 24 hour
- View Stream Gauge data - displayed in feet above stream bed
- View Rain Gauge Alarms - FFG % Yellow 80%, Red 100% (FFG)
- View Stream Gauge Alarms - Yellow (feet above stream bed), Red (Full Bank)
- Transfer to other MON modules:
  - *Rain Gauges*
  - *Stream Gauges*
  - *Flash Flood Guidance*
- Exit to the Operating System

Monitor Properties Bar

MONITOR program properties bar.



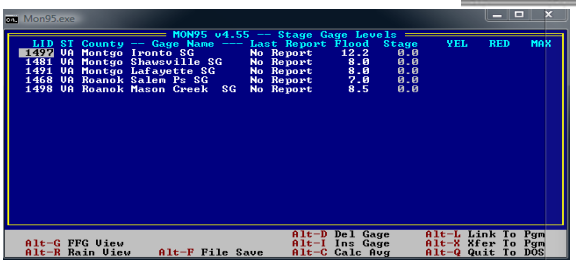
Font Size Change - If you plan to view the MON module in a windowed view you should choose a font size other than ***AUTO***.

Full screen button - Click on to make current MONITOR screen full screen. To return the screen to a windowed view hold down the ALT key and press the ENTER key.

Properties button - ***Caution!*** ***Do Not*** make changes in the settings. Changes made in this program could cause IFLOWS not to work properly.

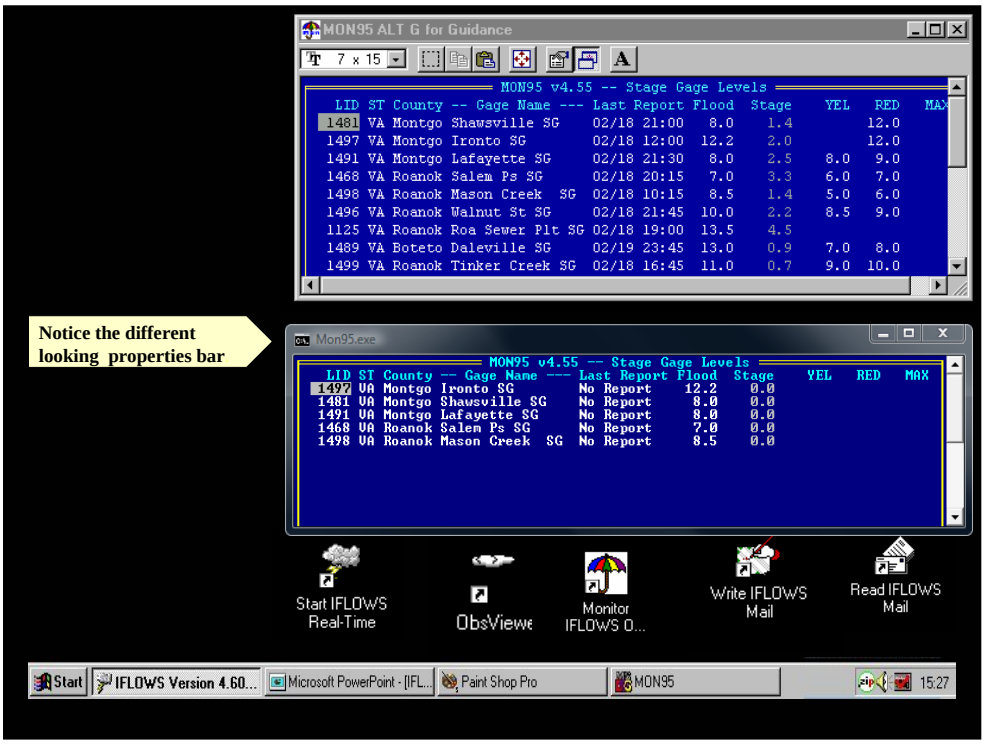
The Background button must always be pushed in or the MONITOR window may not update.

To close the MONITOR window hold down the ALT key and press Q. To minimize the window click on  in the title bar of the window.



IFLOWS Real-Time Version 4.6 when loaded on Windows XP or Vista will not display the properties bar at the top of the MONITOR window. Instead you must right click in the top bar and a properties box will appear were changes can be made.

Multiple Monitor Windows

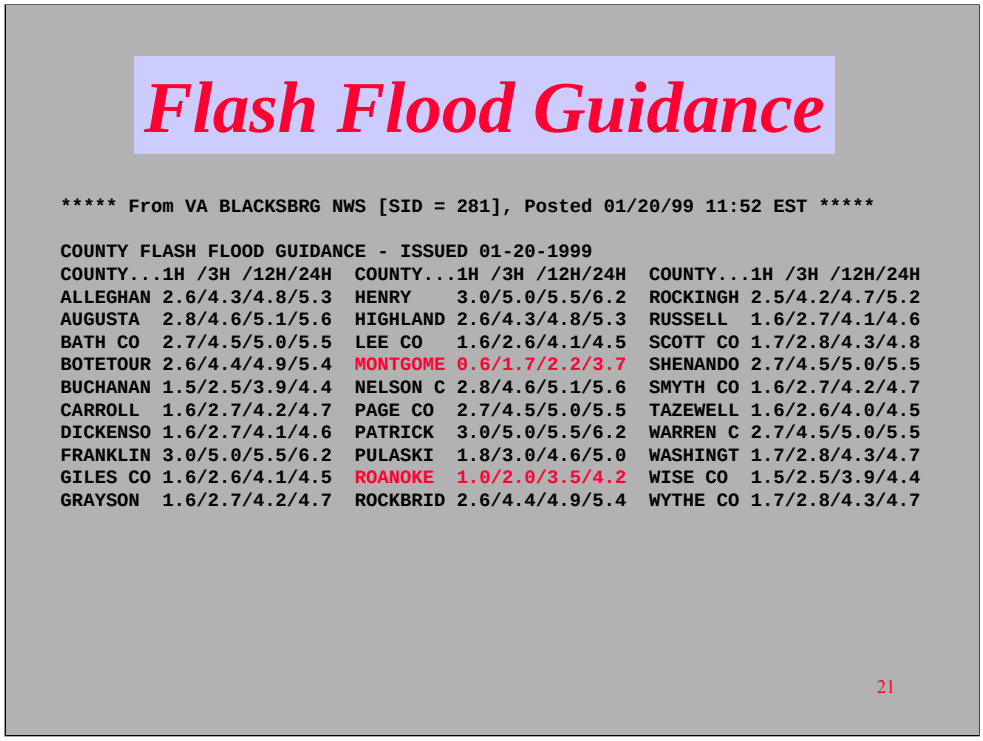


Click on the MONITOR icon again. Another MONITOR screen appears.

The nice feature that Windows brings to IFLOWS is the possibility to view several IFLOWS MONITOR windows on one screen. The example here shows a view of stream gauges and a view of rain gauges on the same screen. Both windows will update automatically.

No Mouse Control in the MONITOR program! You must use your TAB keys or ARROW keys to move your cursor.

Flash Flood Guidance



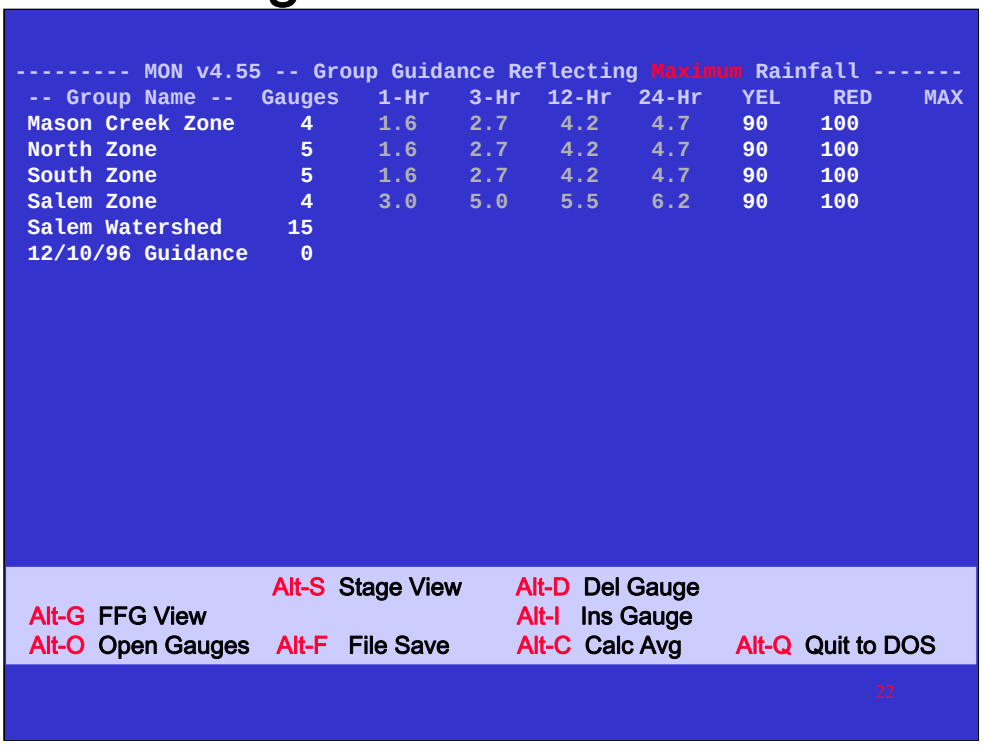
National Weather Service *Flash Flood Guidance* (FFG)

The flash flood guidance (FFG) is provided by the National Weather Service. This message when received by your IFLOWS computer sets off the alert tone advising that there is an IFLOWS message that needs attention. The message will display in the message window containing the traffic light. You can view and print the message by clicking on the Read IFLOWS mail icon. This will also silence the alarm.

FFG represents the amount of rainfall required in a locality to cause ground saturation and small streams to come out of their banks. Additional rainfall exceeding the FFG values will cause runoff into the streams. The more that rainfall exceeds the FFG the more severe the flooding will be. FFG in IFLOWS is calculated in 1 hour, 3 hour, 12 hour, 24 hour time increments.

Click on the Read IFLOWS Mail icon to:
View
Print
Silence Alarm

Entering Flash Flood Guidance



To enter the FFG open the MONITOR program and press the **ALT-G** key. The FFG screen appears. Position the cursor using arrow keys or tab button over the first 1HR field and enter in the FFG value. Press the **TAB key to move to the next field**.

Salem uses the Montgomery County guidance for the following gauge groups: Mason Cove Zone, N Roa River Zone, S Roa River Zone.

The Salem Zone gauge group uses the Roanoke County FFG values.

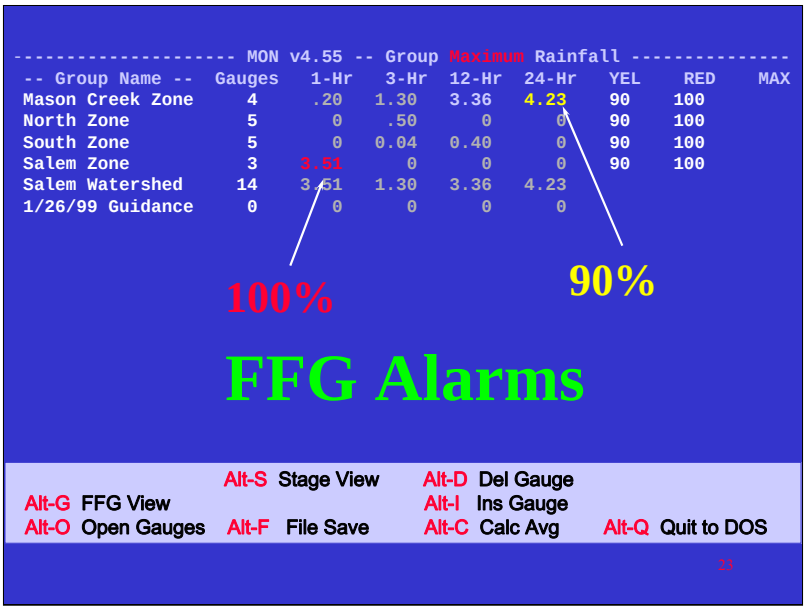
Save the updated values by pressing ALT-F.

For IFLOWS to recognize the new flash flood guidance IFLOWS must be stopped and started.

To stop IFLOWS click on the IFLOWS traffic signal. Confirm the request to stop IFLOWS.

To start IFLOWS click on the traffic signal and the signal will turn green and IFLOWS will be running. The computer will now react and sound alarms based on the updated information.

Flash Flood Guidance Alarms



The FFG alarms are represented by percentages of FFG value.

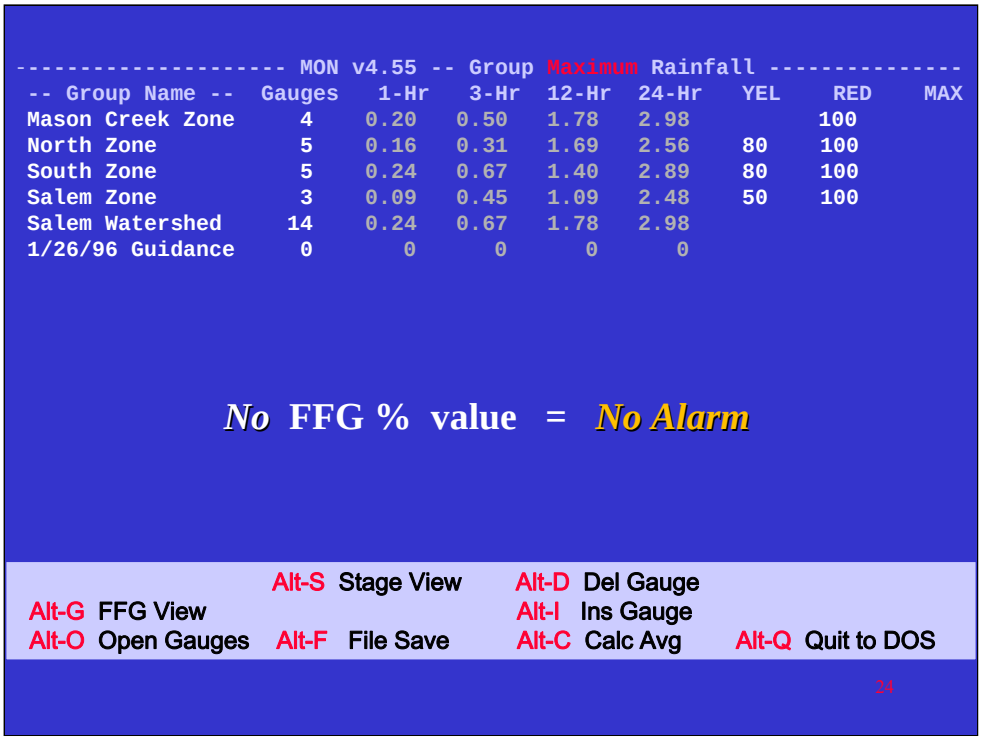
In the above slide 90% of FFG is a YELLOW Alarm, 100% of FFG is a RED alarm.

This slide shows rain gauges in GROUP VIEW. Each gauge group shows rain gauge data from one rain gauge. The software chooses to display the gauge that has reported the most rainfall. This is why this screen is titled *Group Maximum Rainfall.*

The pattern of rainfall displayed in the slide indicates scattered but intense downpours, typical of thunderstorms. It is possible that only one gauge in the ZONE GROUP received rain.

Communications personnel should OPEN the GAGE GROUP and view the individual gauges. The more gauges that report the heavy rain the better the probability that stream levels will rise.

No FFG % Value = No Alarm

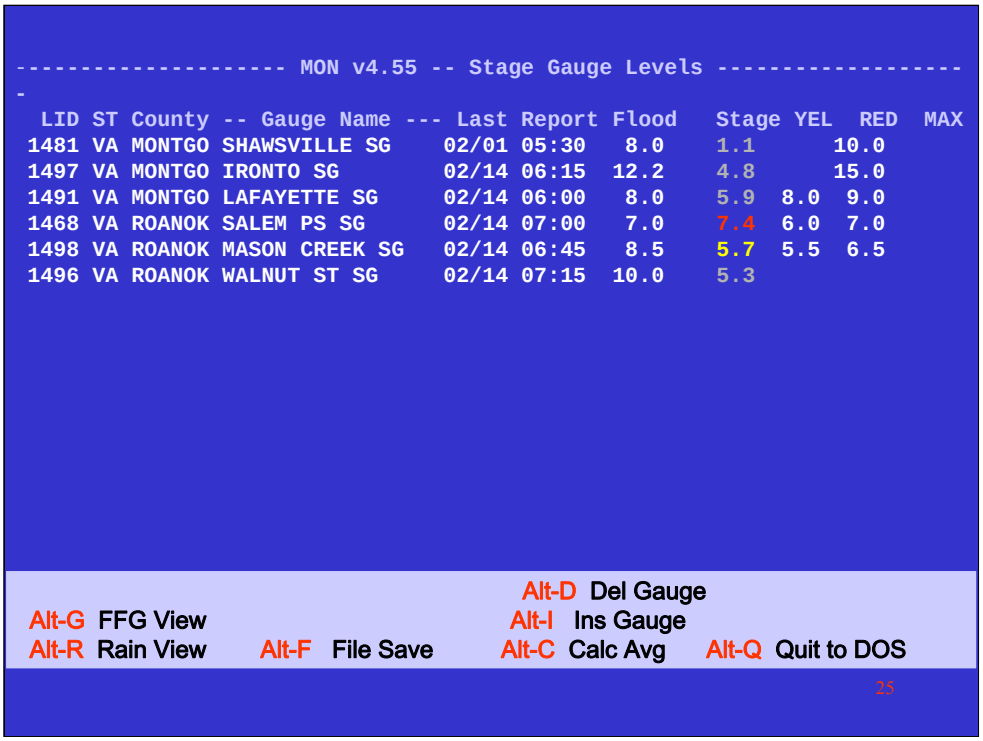


This slide demonstrates a wide spread rain event of uniform coverage. Maximum amounts reported are similar among the different zones. If the GAGE GROUPS were opened you would notice that the reported values would be rather uniform.

Exceeding FFG values by only $^{2}/_{10}$ *inch an hour* has caused streams to overflow their banks.

No Flash Flood Guidance (FFG) percentages have been entered on the Salem Watershed report line. This will result in no alarm messages being displayed for that group of gauges.

Stream Gauge View In Monitor



Stream Gauge View in the MONITOR program

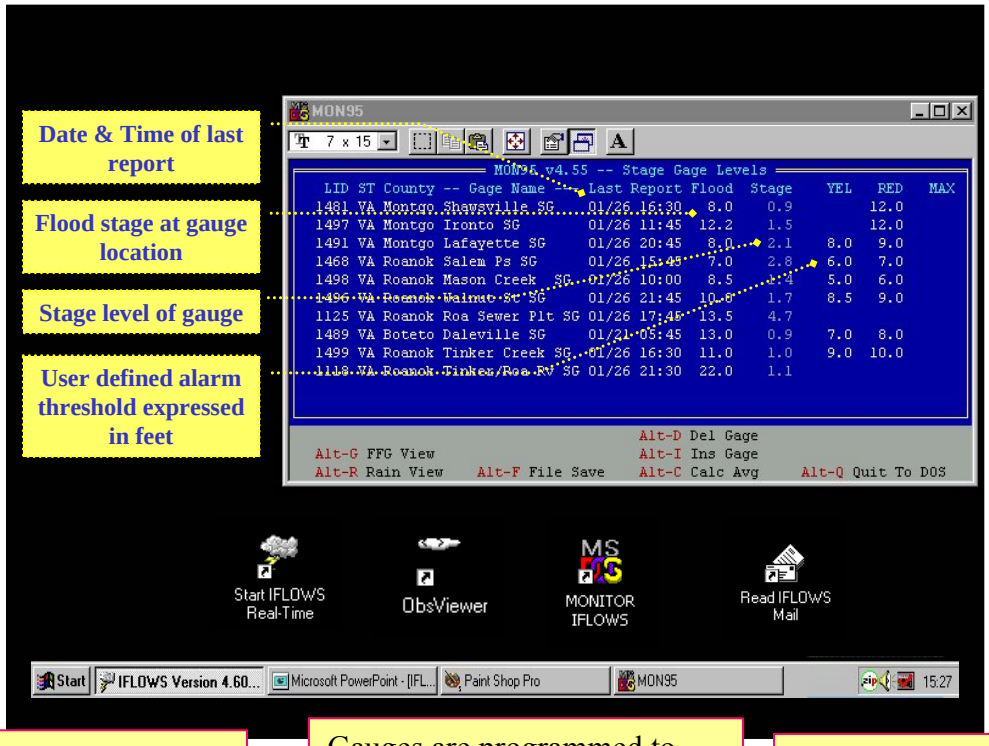
When the MONITOR program opens, by default the program displays rain gauge groups. To view stream gauges you must press the ALT-S (Stage View) keys.

The stream gauges are listed by LID (location ID number), State, County, and Gauge Name. The other columns display

- Date and time of **Last Report**
- **Flood** level at the gauge location to cause flooding (Set by the NWS)
- **Stage** level last reported
- Yellow, Red, Max are user defined alarm thresholds cells.

To change the view back to Rain Gauges press the ALT-R (Rain View) keys.

Stream Gauge Window

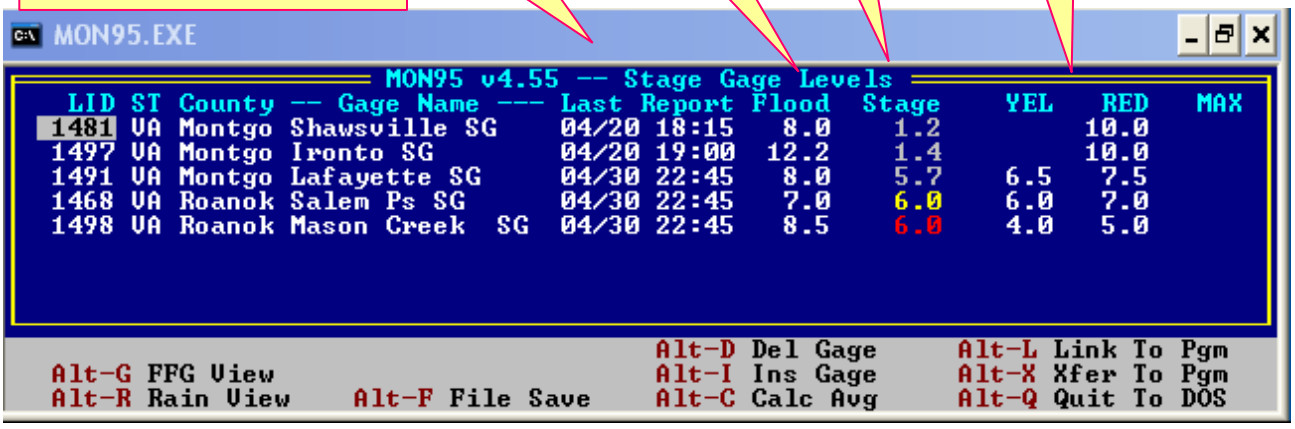


Date and Time of last gauge report. During a flood event this gauge updates frequently. If you receive the gauge data directly then the update occurs when the gauge transmits. If receiving gauge data from the backbone the updated gauge data displays within 15 minutes of the gauge transmission.

Gauges are programmed to report in .1 or .3 of an inch increments. The IFLOWS Program Manager will know the programmed value for your stream gauges.

Flood stage at gauge location

User defined stream gauge alarm thresholds are expressed in feet above the stream bed. You can assign up to 3 alarm thresholds. If the field is left blank then no alarm sounds.



Verify IFLOWS Telemetry

Verify IFLOWS telemetry using what ever methods that you have available.

1. Precipitation weather radar from the National Weather Service.
   * Blacksburg Office http://www.erh.noaa.gov/rnk/
   * Baltimore/Washington Office http://www.erh.noaa.gov/er/lwx/
   * Wakefield Office http://www.erh.noaa.gov/er/akq/

2. Field visual reports.

3. Weather Channel or other media.

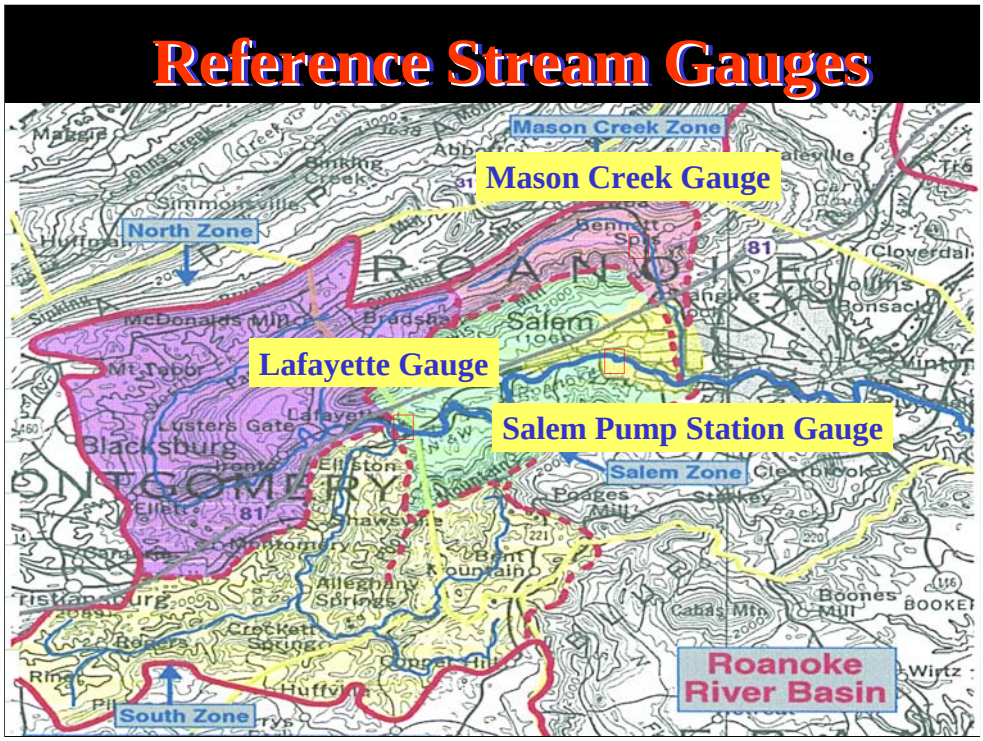
Field Observations Are Important

During Tropical Storm Fran's visit September 1996, several inches of rain fell over the valley. However, because the rainfall was not intense the Roanoke Valley had only minor flooding due to runoff into steams and rivers.

The picture shows a man made dam on Mason Creek. Construction crews working on a interstate 81 bridge built the dam so heavy equipment could cross Mason Creek. Several drain pipes were placed in the dam to allow water to pass through but debris from run off clogged the pipes causing the dam to overtop. The IFLOWS rain gauges that monitored the Mason Creek Zone indicated that there was not enough rainfall to cause flooding. However, the dam had backed up several acres of water and the dam was crumbling. Down stream several houses and 2 trailer parks were in the path of the dammed water. The dam was found by a emergency services field unit sent to verify stream levels. The emergency services worker notified the EOC of the potential danger. Notifications were quickly made to warn those down stream of the danger.

The dam did fail but the water never went out of the creek bank's. It is important to note that dams caused by flood debris also cause water to backup causing unexpected rise in water levels. These debris dams can break causing a sudden unexpected rise in water levels downstream.

Reference Steam Gauge Gives Lead Time



An example of how Salem, Virginia uses reference stream gauges.

Lafayette Stream Gauge - The Army Corps of Engineers' table shows that a gauge level of 9 ft at the Lafayette gauge will produce flooding at the Mill Lane Bridge 2.5 hours later. A 13 ft gauge reading will produce flooding at the Eddy Street Bridge in 2.5 hours.

The Army Corps of Engineers has also provided aerial photos of Salem with overlays showing expected flood levels in Salem based on gauge levels at the Lafayette gauge and the Mason Creek gauge.

Mason Creek Stream Gauge - The Army Corps of Engineers' table shows that a gauge level of 8 ft will produce flooding in Ramey's Trailer Park and Salem Mobile Village Trailer Park in 30 minutes. Several flood events indicated that the 8 ft level was too high. The Mason Creek Stream Gauge red alert was lowered to 5 feet to reflect the flood impacts

.

Mason Creek stream levels react very fast to rain run off.

Rain & Stream Gauge Alarms in the Mason Creek Zone need the highest priority in reporting to the Emergency Services Coordinator.

Document Stream Levels With Pictures

Salem Pump Station Stream Gauge reads 7.5 feet

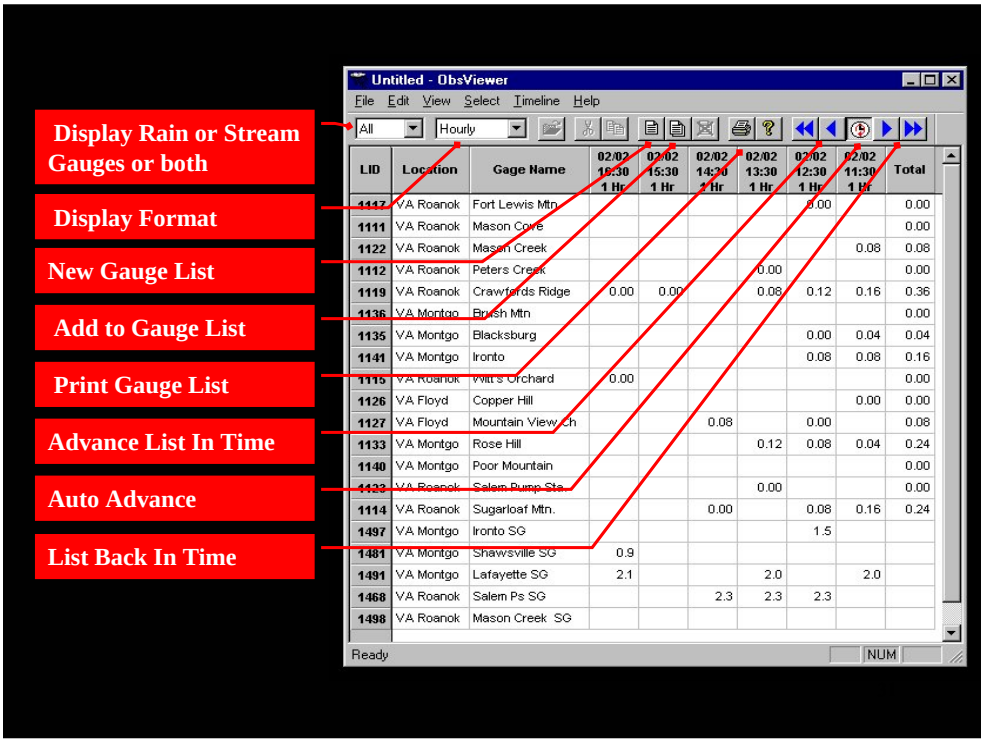
Mill Lane Bridge

Document steam levels using pictures that reference back to your Steam Gauge.

Salem Pump Station Stream Gauge reads 2.0 feet

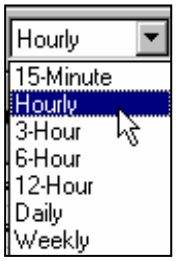
Pictures of high water levels that correlate to a stream gauge level can be a valuable tool documenting impact levels.

View Observations Program



VIEW OBSERVATIONS Program (ObsViewer)

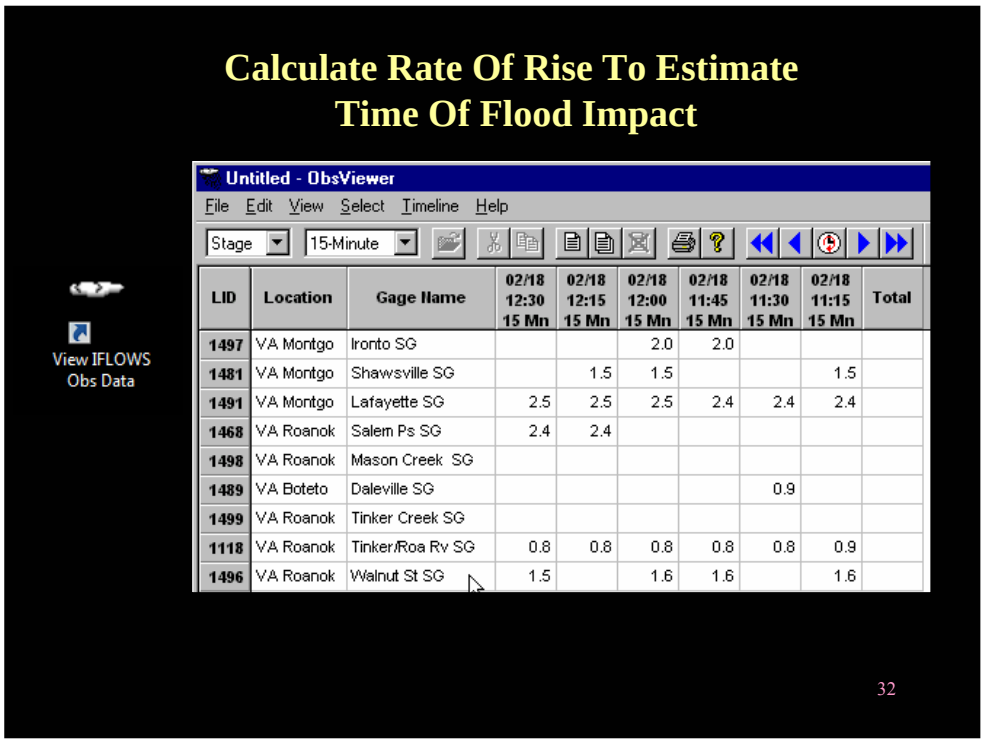
Click on the ObsViewer icon to view rain and stream gauge real time information. This program also allows you to view storm history and print screens as needed.



The screen format opens in the 1 hour format. This allows the user to view 6 hours of data. Rain gauges shows rainfall totals for the displayed times. Stream gauges do not show any values in the total column. This screen will update automatically.

Rain and Stream (Stage) gauges can be viewed or the user may wish to only view rain gauges or just stream gauges. During an event in which streams are rising the user may wish to view only Stream (Stage) gauges. The user can quickly start to calculate rate of rises in the streams. This is helpful to Emergency Managers estimating when flood waters will impact their community.

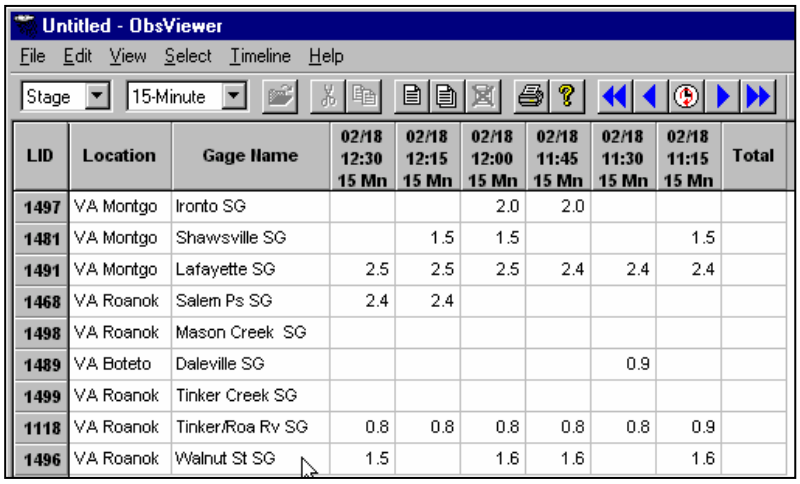
Calculate Rate Of Rise



LID	Location	Gage Name	02/18 12:30 15 Mn	02/18 12:15 15 Mn	02/18 12:00 15 Mn	02/18 11:45 15 Mn	02/18 11:30 15 Mn	02/18 11:15 15 Mn	Total
1497	VA Montgo	Ironto SG			2.0	2.0			
1481	VA Montgo	Shawsville SG		1.5	1.5			1.5	
1491	VA Montgo	Lafayette SG	2.5	2.5	2.5	2.4	2.4	2.4	
1468	VA Roanok	Salem Ps SG	2.4	2.4					
1498	VA Roanok	Mason Creek SG							
1489	VA Boteto	Daleville SG					0.9		
1499	VA Roanok	Tinker Creek SG							
1118	VA Roanok	Tinker/Roa Rv SG	0.8	0.8	0.8	0.8	0.8	0.9	
1496	VA Roanok	Walnut St SG	1.5		1.6	1.6		1.6	

During a potential flood event the *Time Report Format* should be set to 15 Minutes display.

This will allow 6 reports to be viewed covering a span of $1^1/_2$ hours. The above slide is formatted to display 15 minute time increments. The time column to the left is the most recent gauge report.



LID	Location	Gage Name	02/18 12:30 15 Mn	02/18 12:15 15 Mn	02/18 12:00 15 Mn	02/18 11:45 15 Mn	02/18 11:30 15 Mn	02/18 11:15 15 Mn	Total
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1491	VA Montgo	Lafayette SG	2.5	2.5	2.5	2.4	2.4	2.4	
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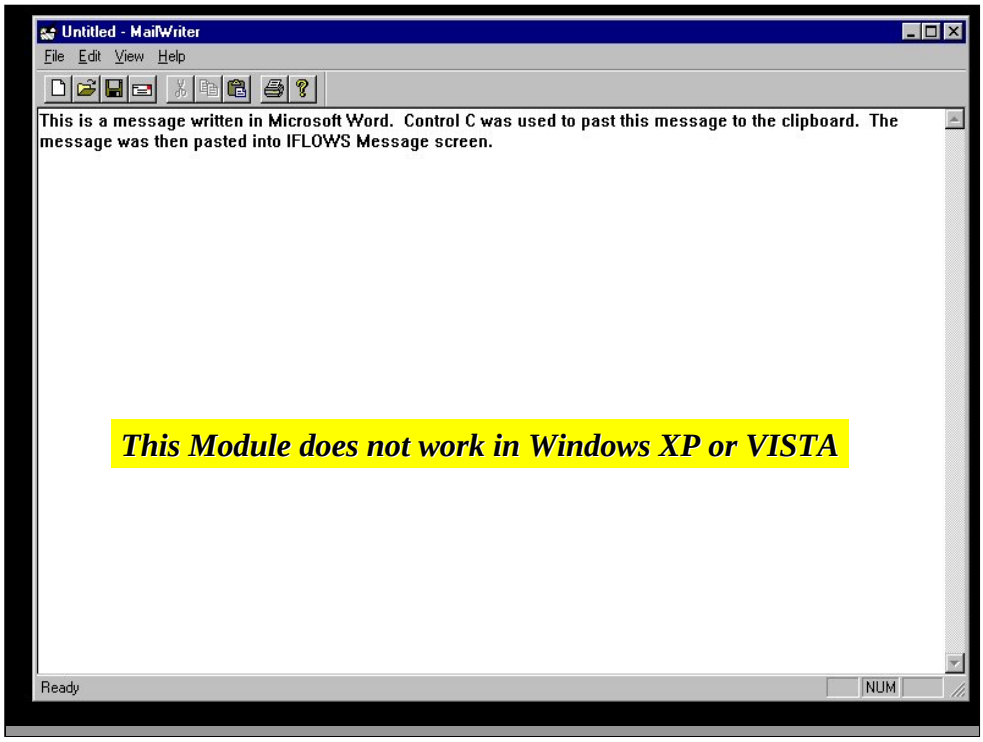
1499	VA Roanok	Tinker Creek SG							
1118	VA Roanok	Tinker/Roa Rv SG	0.8	0.8	0.8	0.8	0.8	0.9	
1496	VA Roanok	Walnut St SG	1.5		1.6	1.6		1.6	

This screen shows a slow rate of rise. Some gauges are even showing a fall in stage levels.

Rate of rise exceeding .3 feet every 15 minutes indicates a fast evolving event.

IFLOWS Mail Writer

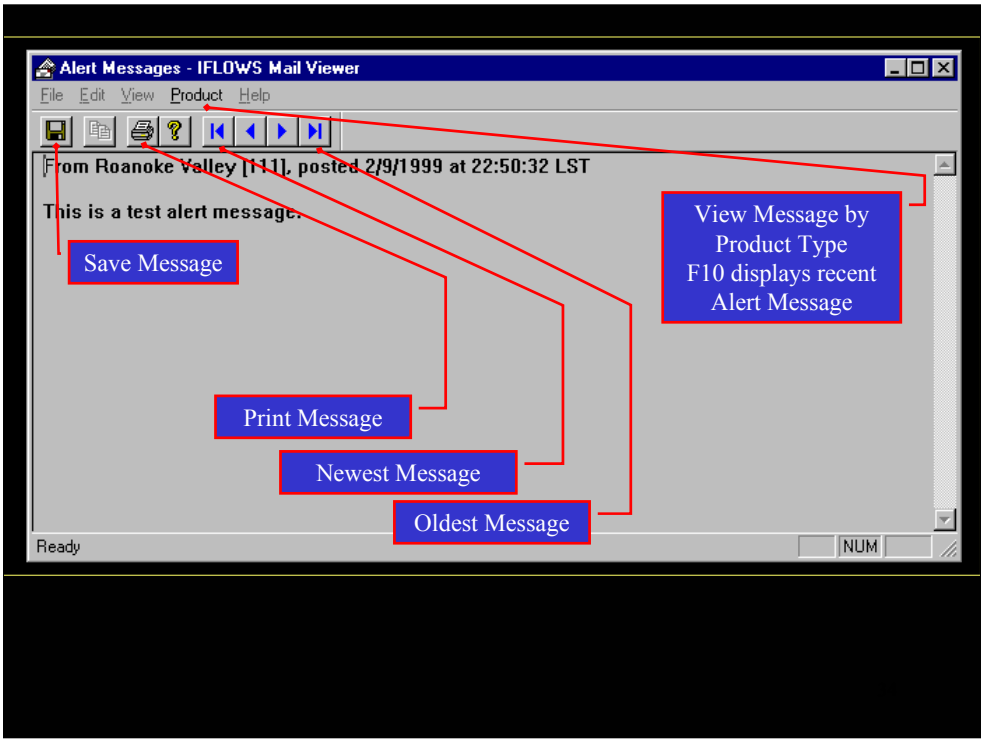


This Module does not work in Windows XP or VISTA

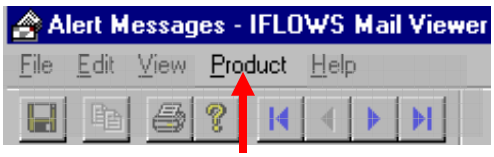
The IFLOWS Write Mail module does not work on the Windows XP and VISTA operating systems.

You can still receive messages.

IFLOWS Read Mail

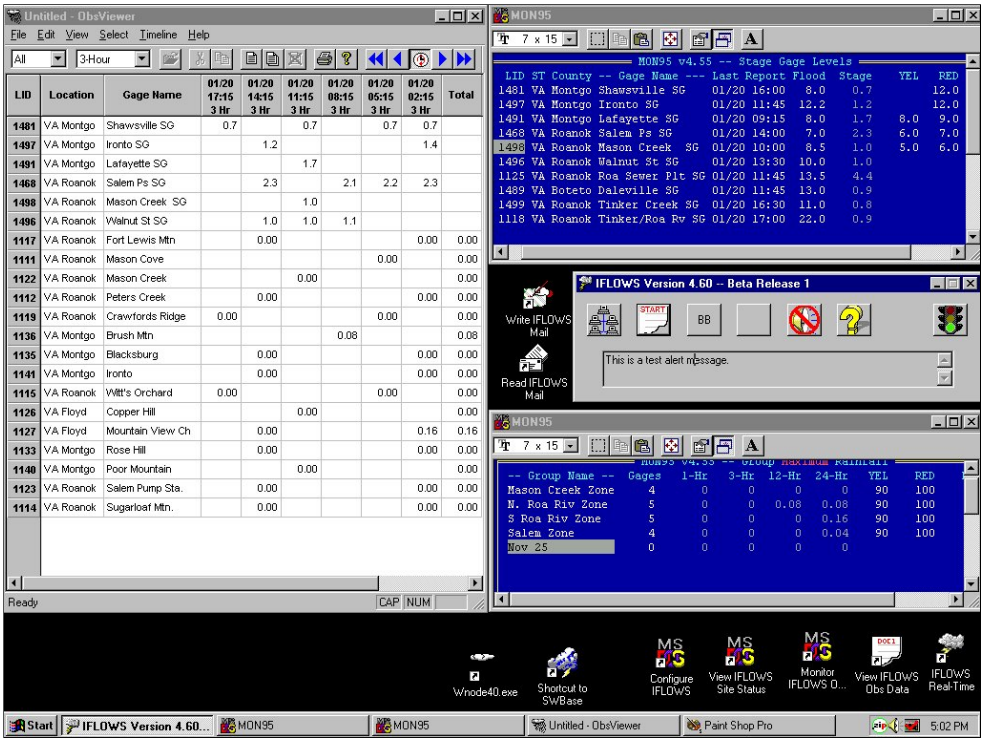


View, Save, and Print Messages.



There are 3 message categories found in the PRODUCT drop down menu: ALERTS, ERRORS, ADIMINISTRATIVE. You can sort by message category and view only the messages category chosen. Press F10 and the most recent ALERT message is displayed.

Key Points to Remember



Using a 17 inch or larger monitor the user can view rain and stream gauges, recent messages, IFLOWS program status as well real-time and history reports from rain and stream gauges. This gives the IFLOWS operator a lot of information on which decisions can be made.

Key points to remember:

✓ **Flash flood guidance must be updated to calibrate the computer alarms to ambient conditions. Once values are entered in the FFG screen you must press ALT F to save the new values and then stop and restart ILFOWS. Now IFLOWS will accept the new values and alarm accordingly.**

✓ **Validate IFLOWS telemetry using field reports, precipitation radar, weather media outlets like the Weather Channel and local news.**

✓ **Use *View IFLOWS Obs Data* program to verify that gauges are working properly. This is especially important prior to a forecasted potential flood event.**

✓ **Use *View IFLOWS Obs Data* program to monitor steam rate of rise by changing the display to 15 minute updates.**

✓ **For IFLOWS tech support call Mark Slauter 1-804-674-2405 mark.slauter@vdem.virginia.gov or**

✓**Jim Meece 1-423-323-1921 jmeece@charterinternet.com**

This presentation was developed by **Ray Bristow, VDEM IFLOWS instructor.**

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